

09728407, 120100

00726407-120100

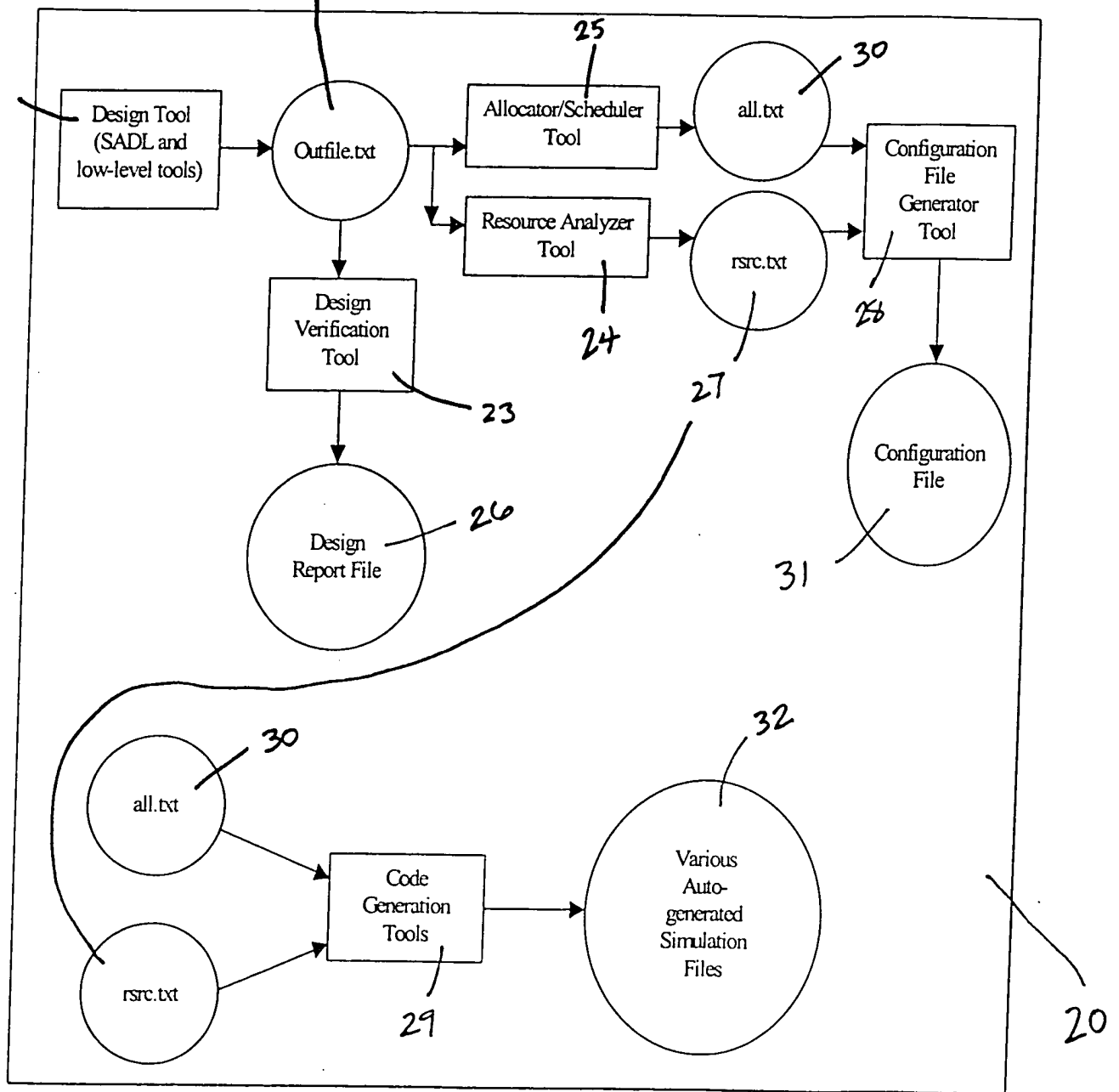


Fig. 2

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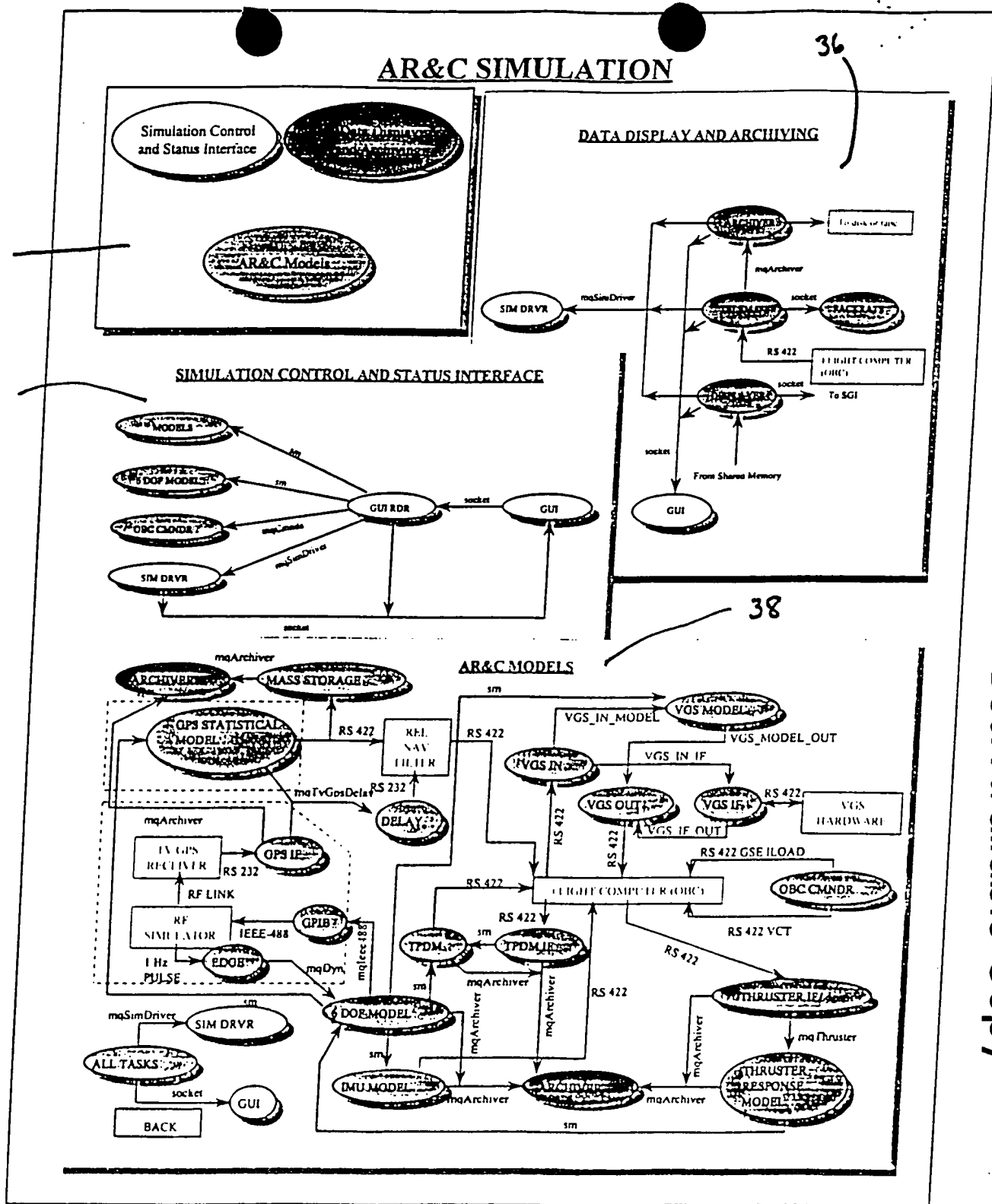
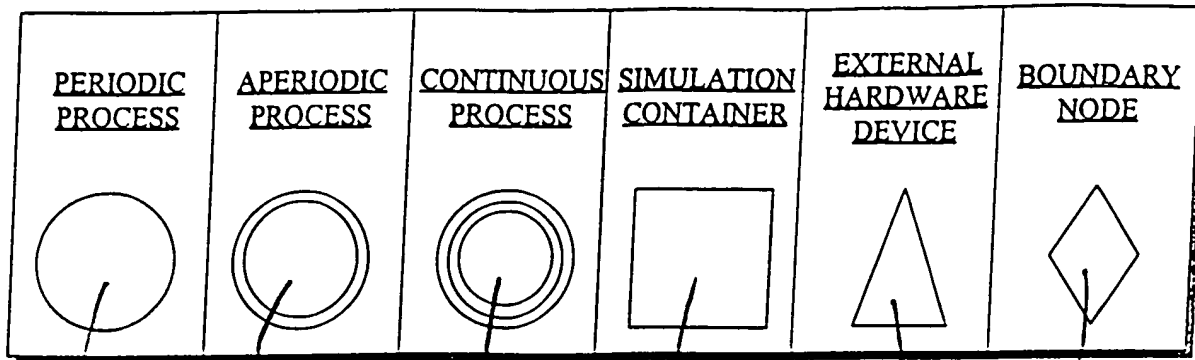


Fig 3. AR&C Simulation architecture.

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Fig 4 SADL node representations.

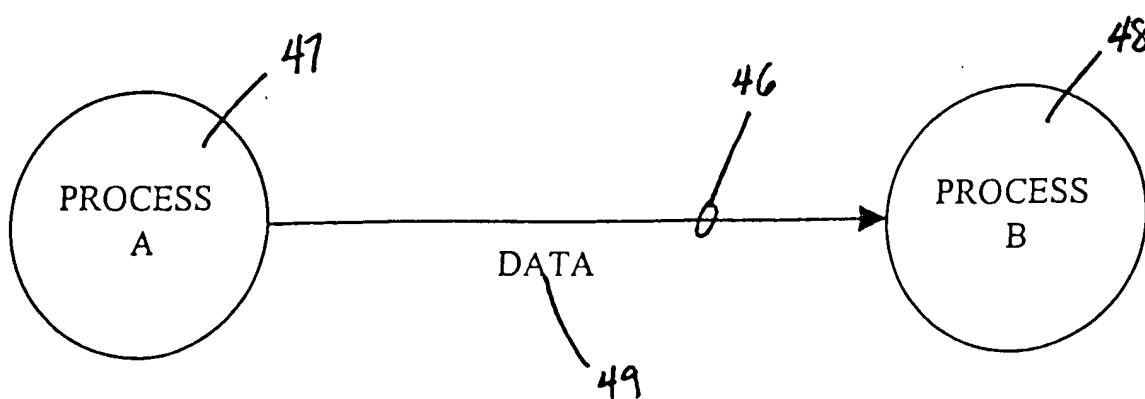


Fig 5 Periodic process A transfers data to periodic process B.

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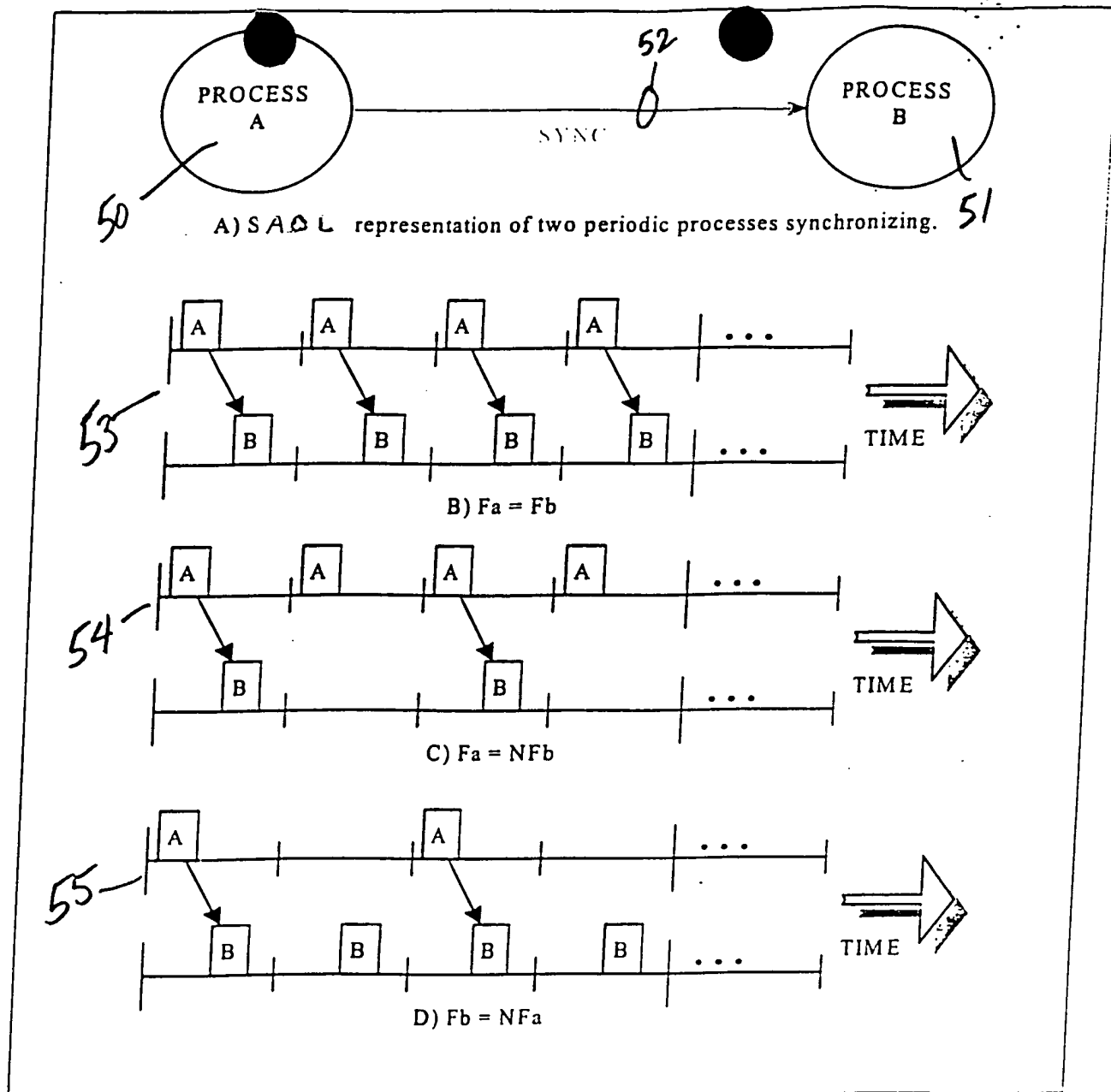


Fig 6. The semantics of two periodic processes synchronizing.

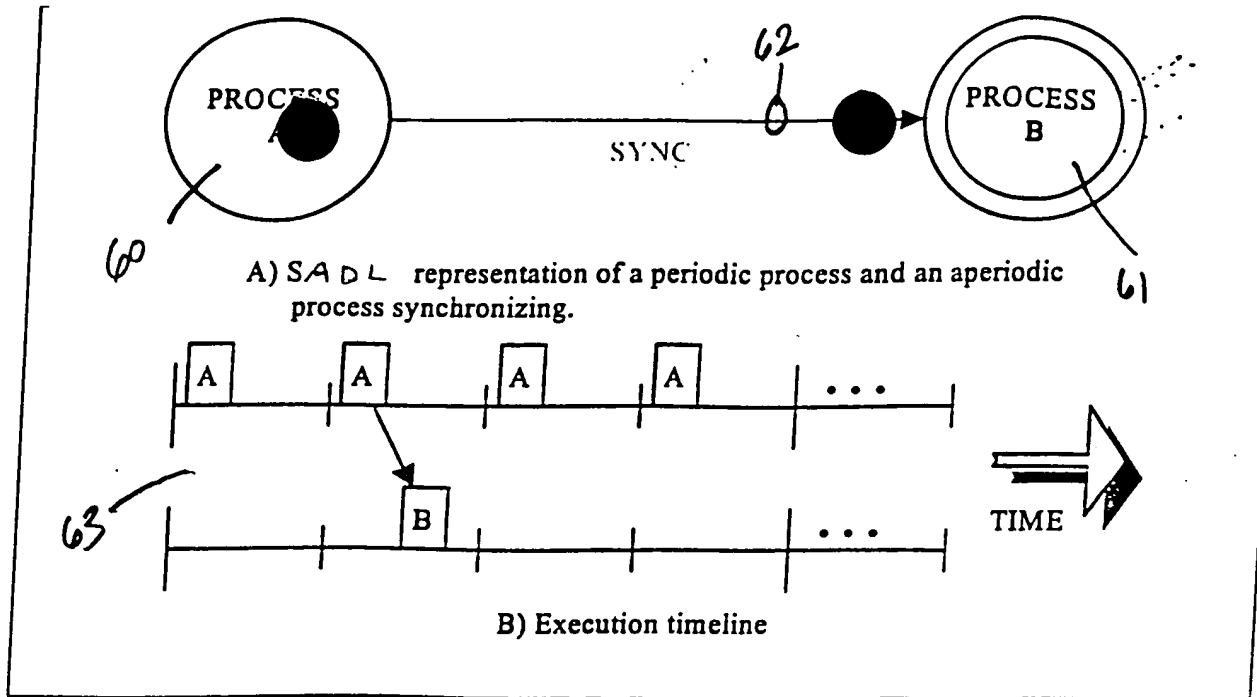


Fig. 7. Aperiodic process B requires synchronization from periodic process A.

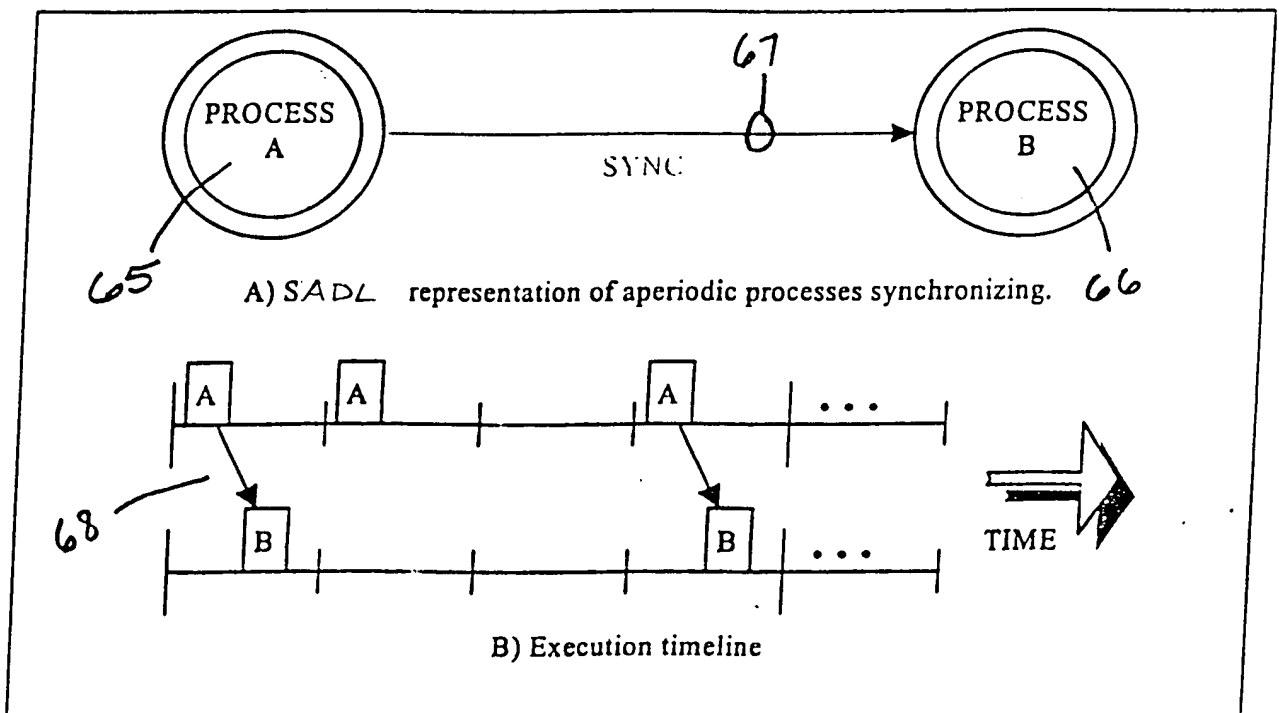


Fig. 8. Synchronization between two aperiodic processes.



75

PROCESS A

77

SYNC

PROCESS B

76

A) SADL representation of periodic process synchronizing with a continuous process.

78

A

A

A

A

...

B

...

TIME

B)  $F_s = F_a$

79

A

A

A

A

...

B

...

TIME

C)  $F_a = NF_s$

**Fig. 10 Synchronization from a periodic process to a continuous process.**



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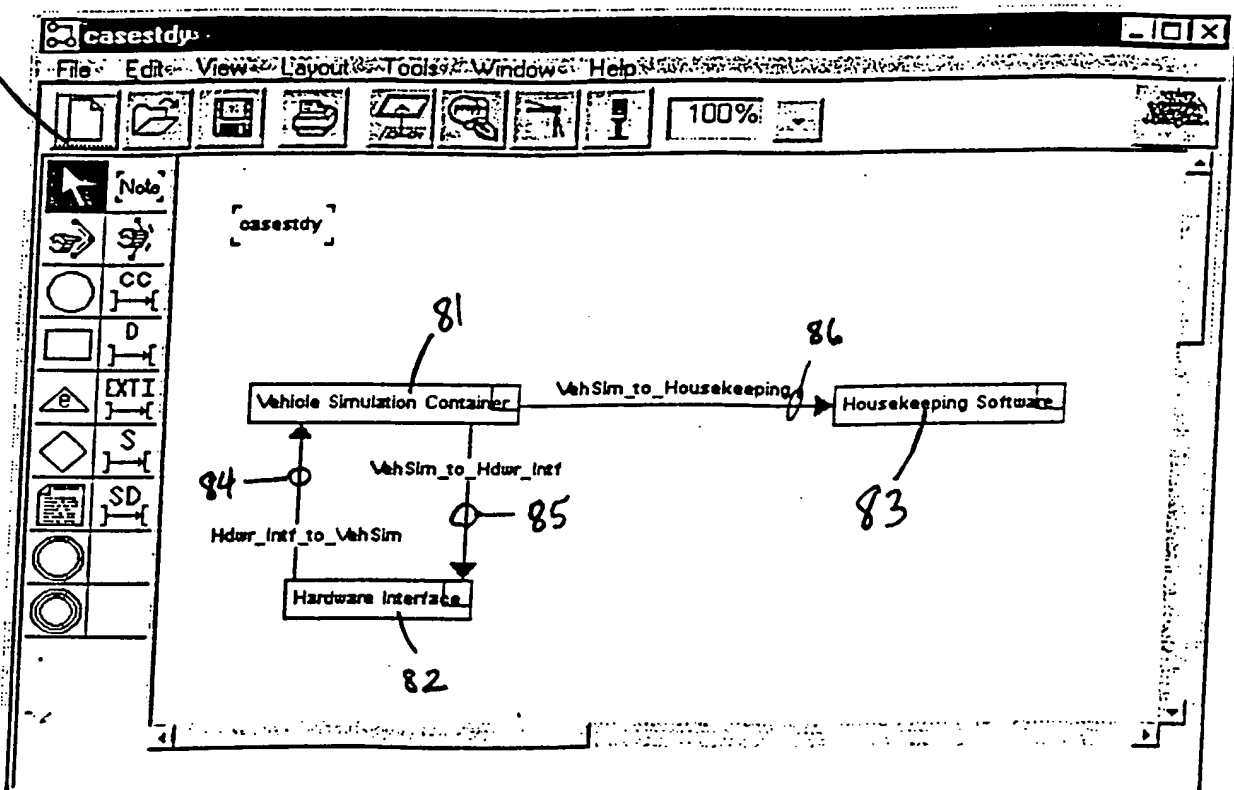


Fig 91 Top-level description of the architecture of the simulation.

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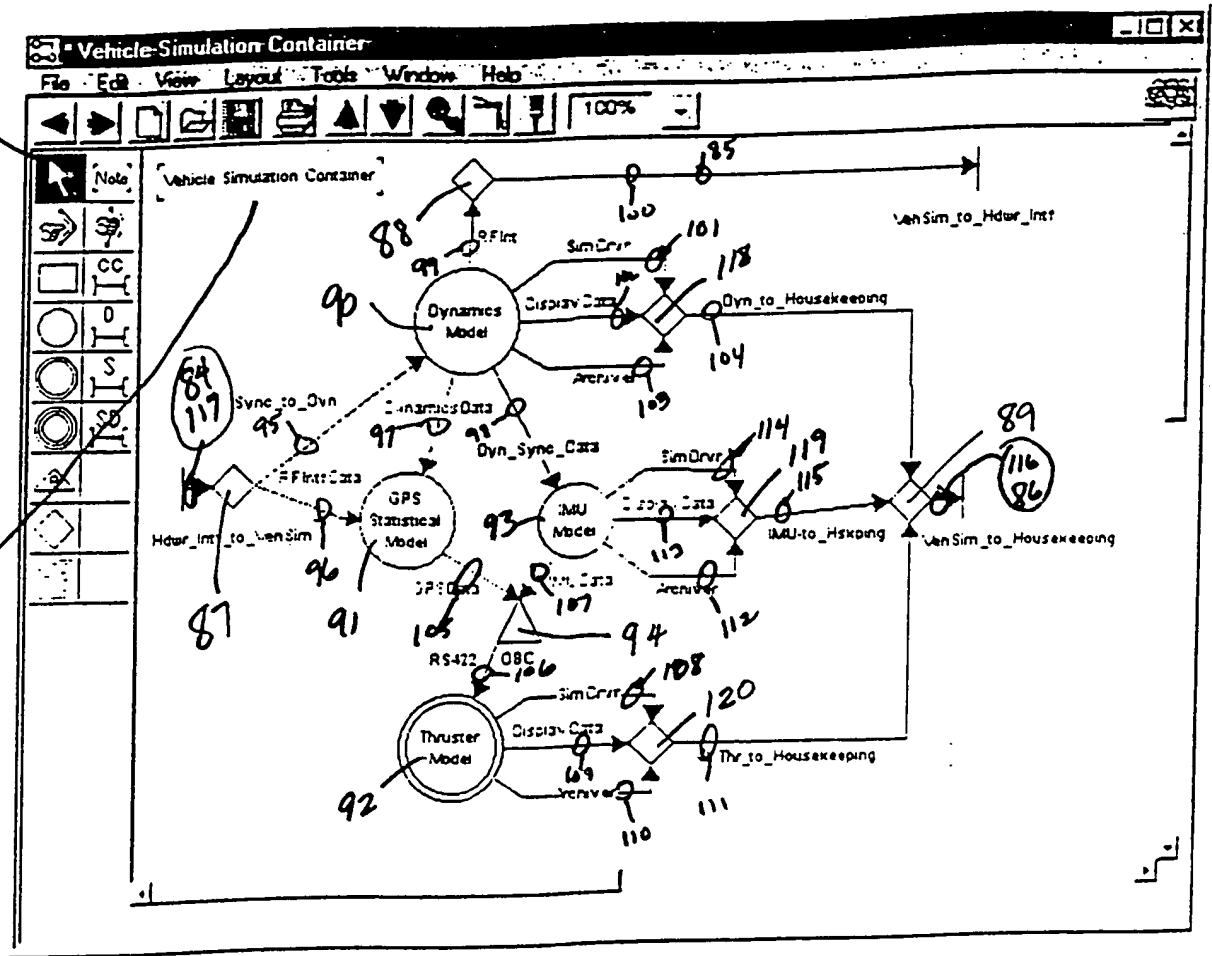


Fig 12 The vehicle-simulation portion of the design.

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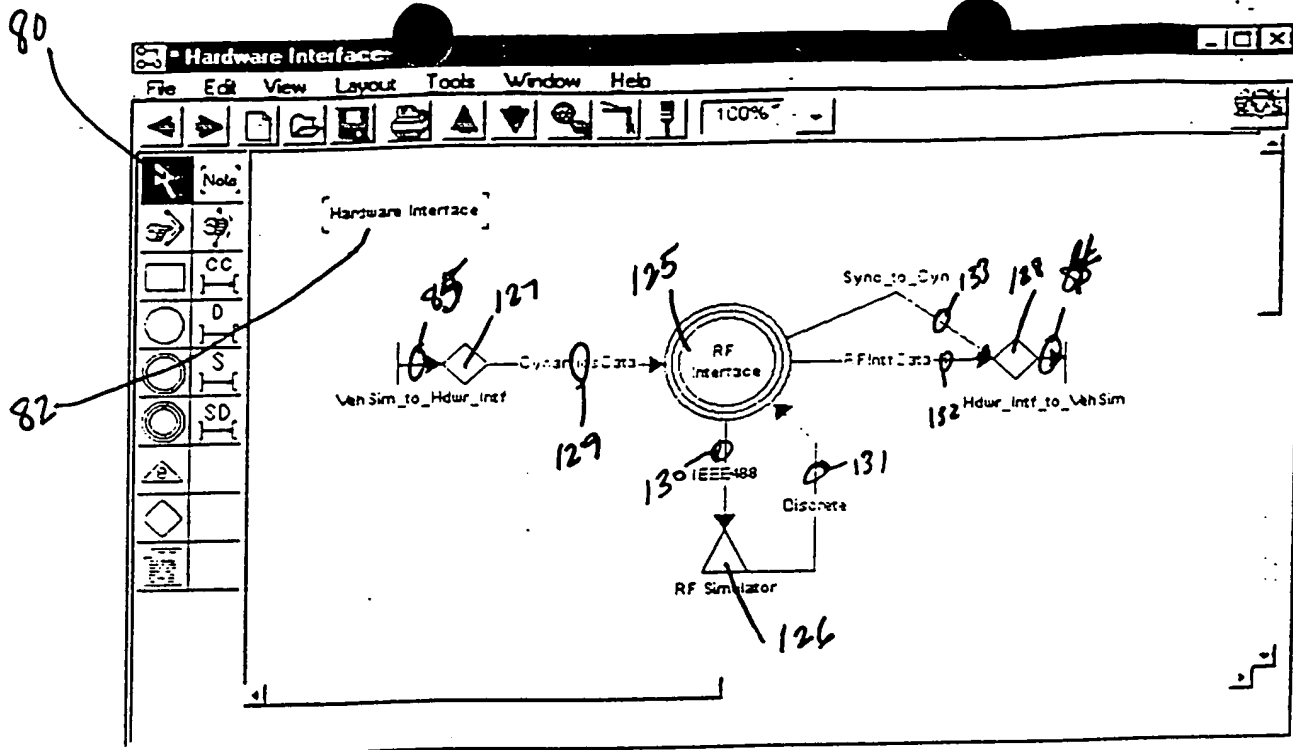


Fig. 13 The hardware interface portion of the design.

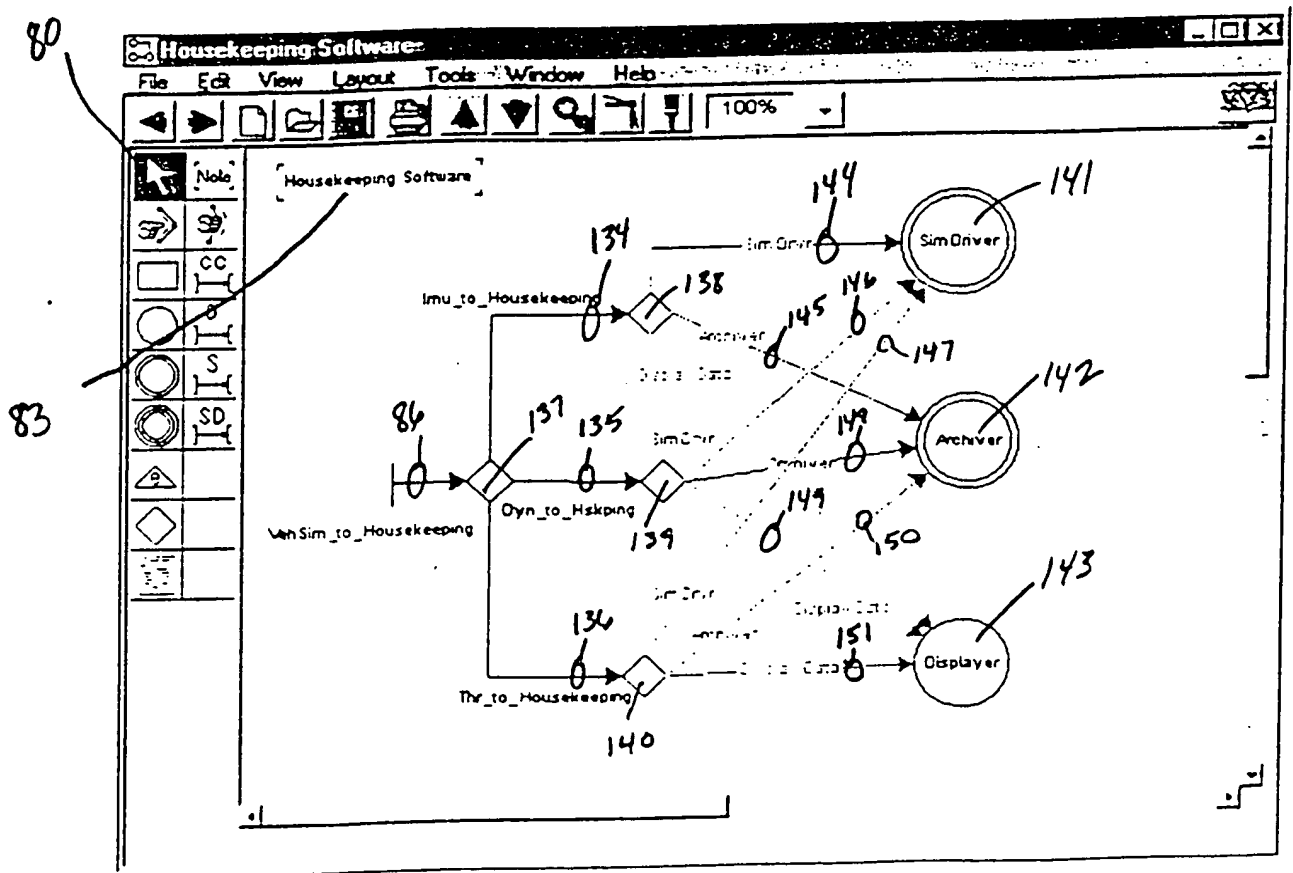


Fig. 14 The housekeeping software portion of the design.

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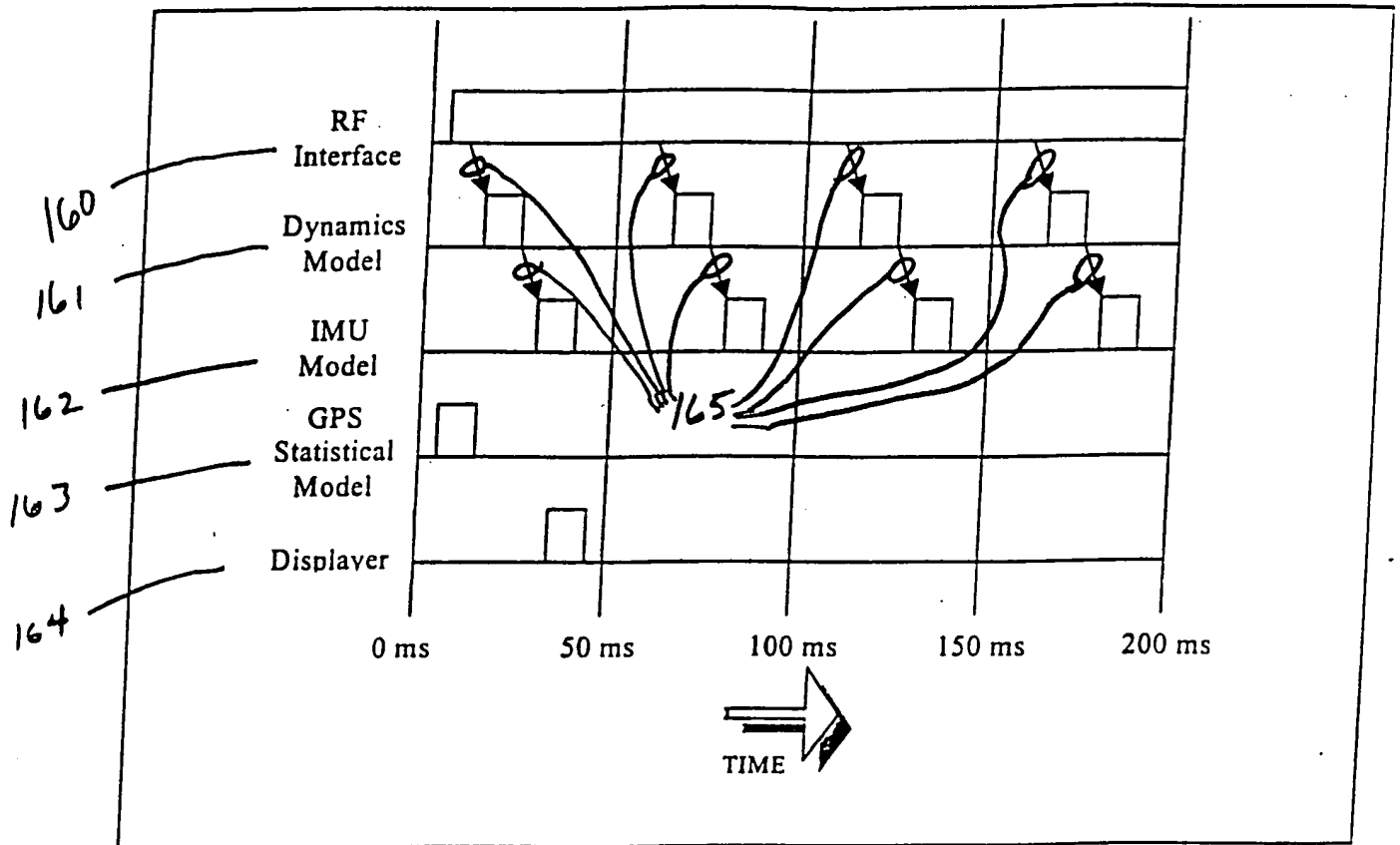


Fig. 15. Execution timeline for AR&C simulation.

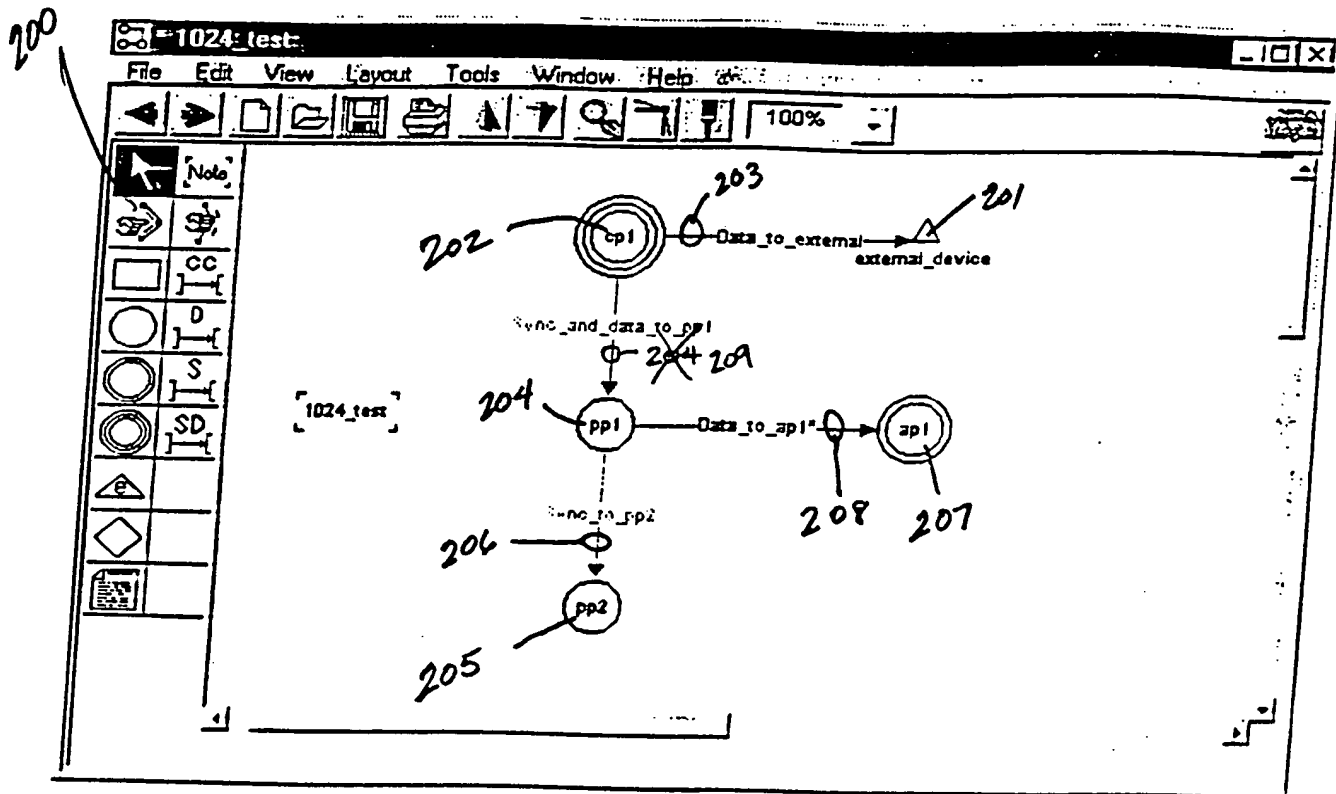


Fig. 16

**Cont: process** [ ] [ ] [X]

File Edit View

Name: cp1

Name	Description	Rationale	Traceability
Color	X-Rets	Overlays	Properties

Priority:  100

Processor:  1

Immediate Predecessors:  nil

Command line arguments:

Pathname:  /home/ricks/

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Fig. 19.

211

**Per process:** [File Edit View]

Name: pp2

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Command line arguments: ☒ [ ]

Duration: ☐ 10

FRS Status: ☒ 0 [ ] [ ] [ ]

Pathname: ☐ /home/ricks/

Frequency: ☐ 50

Deadline: ☐ 10

Processor: ☐ 4

[Apply]

Fig. 18

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**Per process:** [File Edit View]

Name: pp1

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Command line arguments: ☒ [ ]

Duration: ☐ 10

FRS Status: ☒ 0 [ ] [ ] [ ]

Pathname: ☐ /home/ricks/

Frequency: ☐ 20

Deadline: ☐ 10

Processor: ☐ 2

[Apply]

Fig. 19



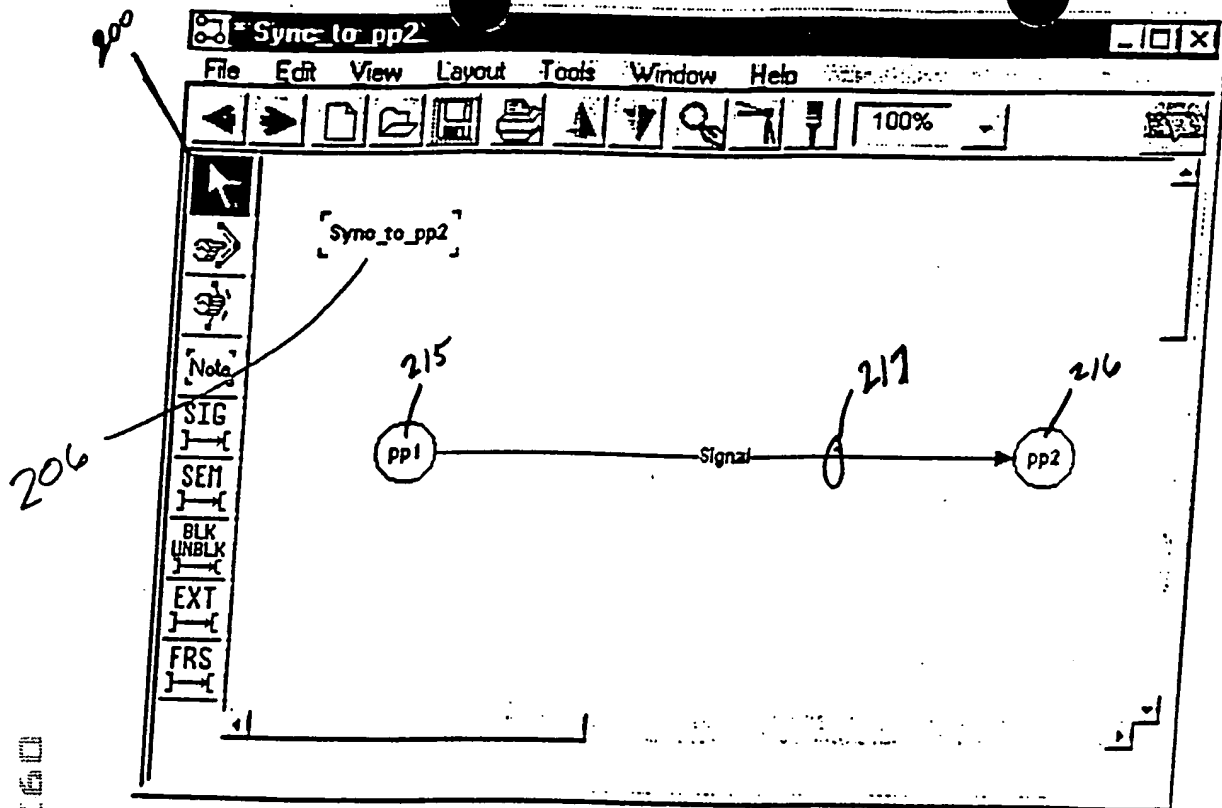


Fig. 22

Sync

File Edit View

Name: Sync\_to\_pp2

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Frequency: 20

Release time: 0

Apply

Fig. 23

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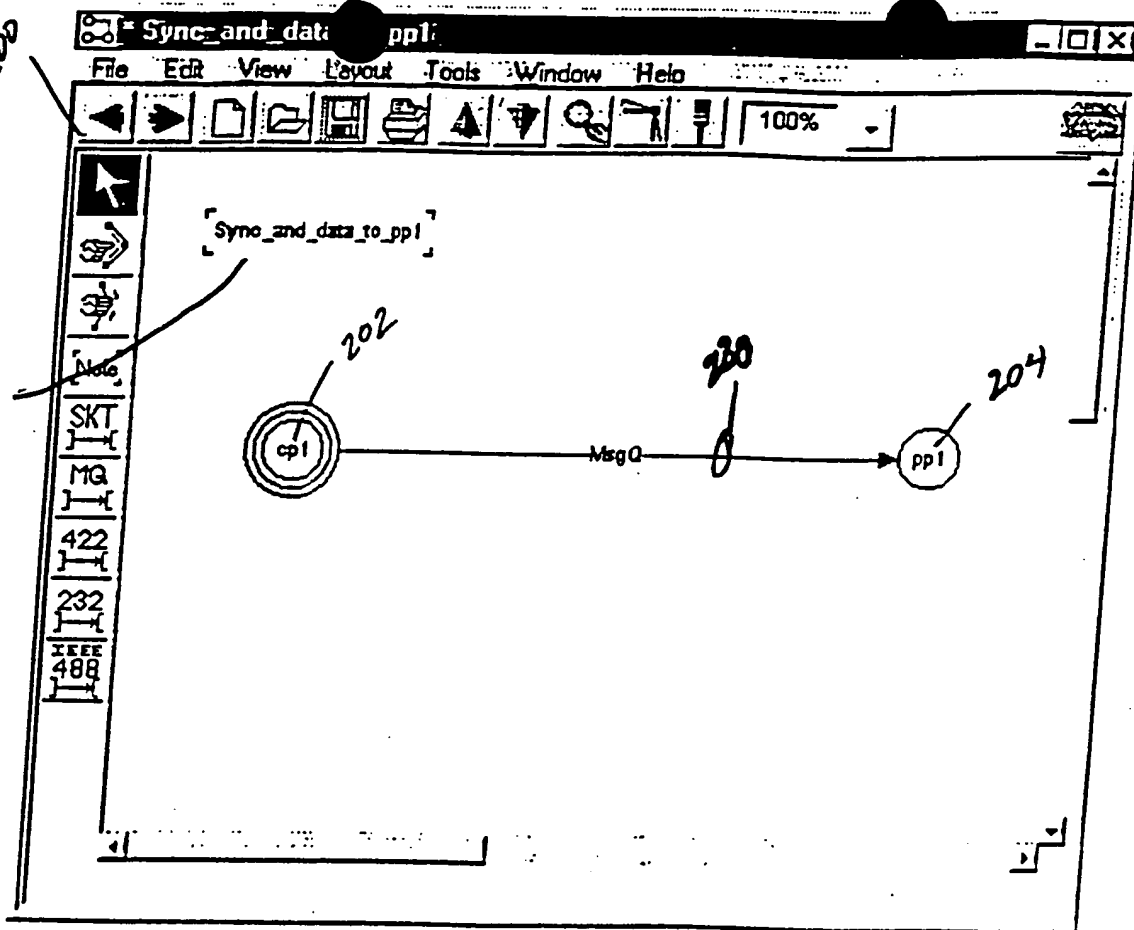


Fig. 24

The "MsgQueue" dialog box displays the following information:

- Name:** MsgQ
- Table:**

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties
- Depth:** ☒ 1
- Data:** ☒
  - nil
- Buttons:** Apply

Fig. 25

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Socket

File Edit View

Name: new Socket

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Data: ☒

nil

PortNumber: ☒ 0

Apply

Fig. 26

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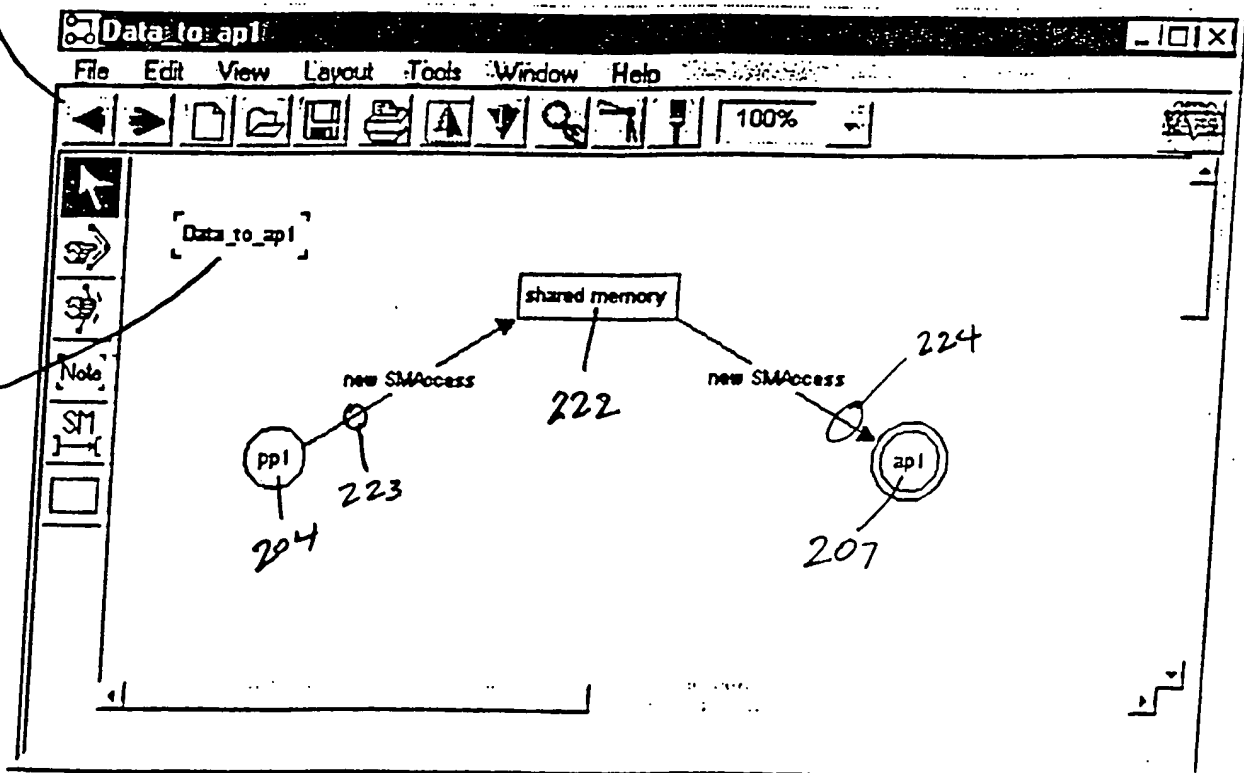


Fig. 27

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**SMAccess**

File Edit View

Name: **new SMAccess**

Name	Description	Rationale	Traceability
Color	X-Rets	Overlays	Properties

Data: ☒

**Apply**

Fig. 28

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**SharedMem**

File Edit View

Name: **shared memory**

Name	Description	Rationale	Traceability
Color	X-Rets	Overlays	Properties

Data: ☒

**Apply**

Fig. 29

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```

Duration 5
Deadline 20
Immediate_Predecessors
"nil"
End_Immediate_Predecessors
Incomingarcs
    Data_to_ap1
End_Incomingarcs
Outgoingarcs
End_Outgoingarcs
End_Aper_process

Cont_process "cp1"
    Processor 1
    Priority 100
    Commandlineargs ""
    Pathname "/home/ricks/"
    Immediate_Predecessors
"nil"
    End_Immediate_Predecessors
    Incomingarcs
    End_Incomingarcs
    Outgoingarcs
        Sync_and_data_to_pp1
        Data_to_external
    End_Outgoingarcs
End_Cont_process

External "external_device"
    Incomingarcs
        Data_to_external
    End_Incomingarcs
    Outgoingarcs
    End_Outgoingarcs
End_External

Data "Data_to_ap1"
    Origin "pp1"
    Destination "ap1"
End_Data

SyncData "Sync_and_data_to_pp1"
    Frequency 20
    Releasetime 0
    Origin "cp1"
    Destination "pp1"

```

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End\_SyncData

Sync "Sync\_to\_pp2"  
 Frequency 20  
 Releasetime 0  
 Origin "pp1"  
 Destination "pp2"  
 End\_Sync

Data "Data\_to\_external"  
 Origin "cp1"  
 Destination "external\_device"  
 End\_Data

Signal "Signal"  
 Origin "pp1"  
 Destination "pp2"  
 End\_Signal

MsgQueue "MsgQ"  
 Origin "cp1"  
 Destination "pp1"  
 Depth 1  
 Data  
 "nil"  
 End\_Data  
 End\_MsgQueue

Per\_process "pp1"  
 Processor 2  
 Priority 0  
 Commandlineargs ""  
 Pathname "/home/ricks/"  
 Frequency 20  
 Duration 10  
 Deadline 10  
 Immediate\_Predecessors  
 "ppp2"  
 End\_Immediate\_Predecessors

```

FRSStatus 0
Incomingarcs
End_Incomingarcs
Outgoingarcs
    new SMAccess
End_Outgoingarcs
End_Per_process

Aper_process "apl"
    Processor 3
    Priority 50
    Commandlineargs ""
    Pathname "/home/ricks/"
    Duration 5
    Deadline 20
    Immediate_Predecessors
"nil"
    End_Immediate_Predecessors
    Incomingarcs
        new SMAccess
    End_Incomingarcs
    Outgoingarcs
    End_Outgoingarcs
End_Aper_process

" SharedMem "shared memory"
    Data
nil
    End_Data
    Incomingarcs
        new SMAccess
    End_Incomingarcs
    Outgoingarcs
        new SMAccess
    End_Outgoingarcs
End_SharedMem

SMAccess "new SMAccess"
    Origin "ppl"
    Destination "shared memory"
    Data
nil
    End_Data
End_SMAccess

SMAccess "new SMAccess"

```

Origin "shared memory"  
 Destination "apl"  
 Data

nil

End\_Data  
 End\_SMAccess

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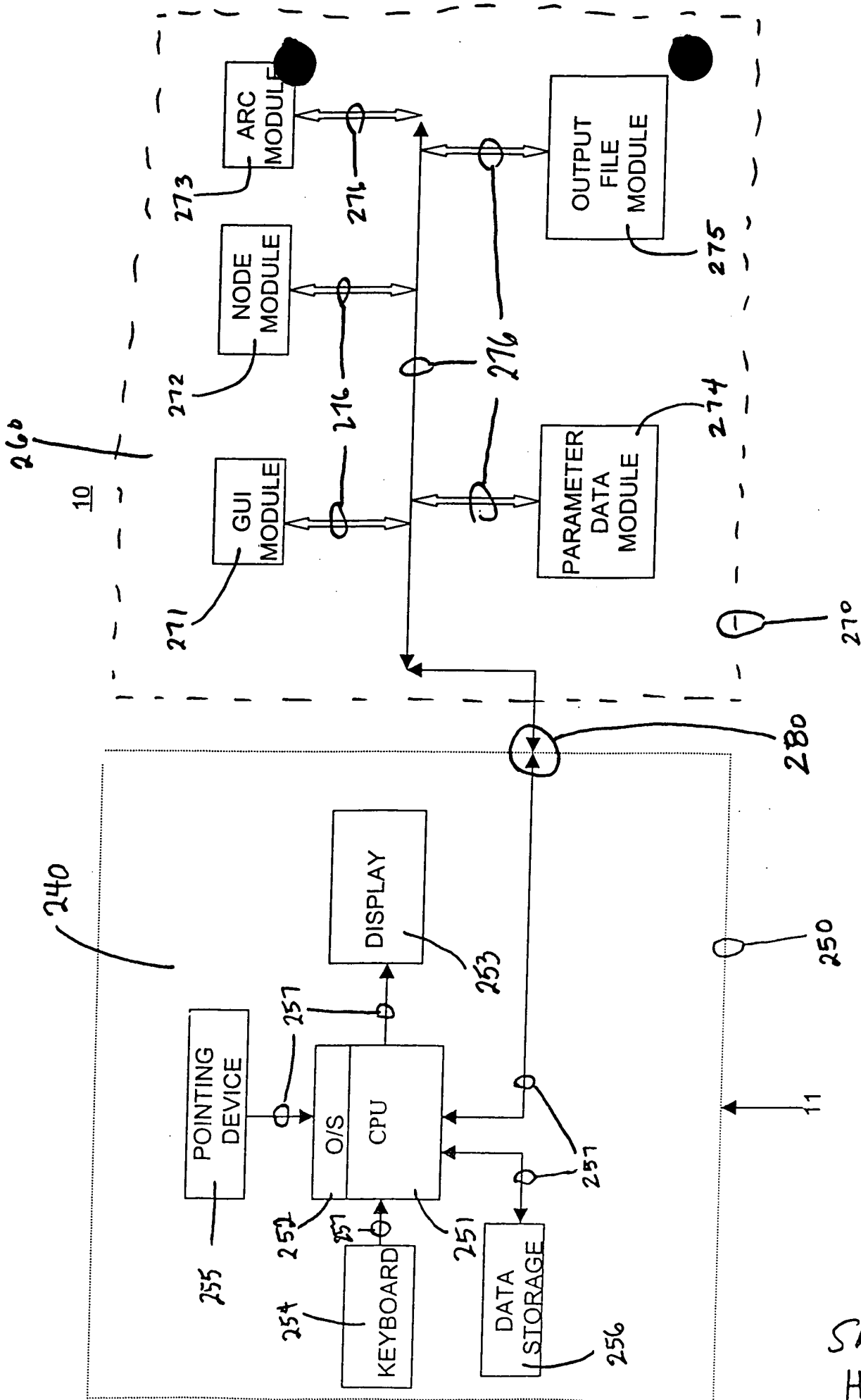


FIG. 31

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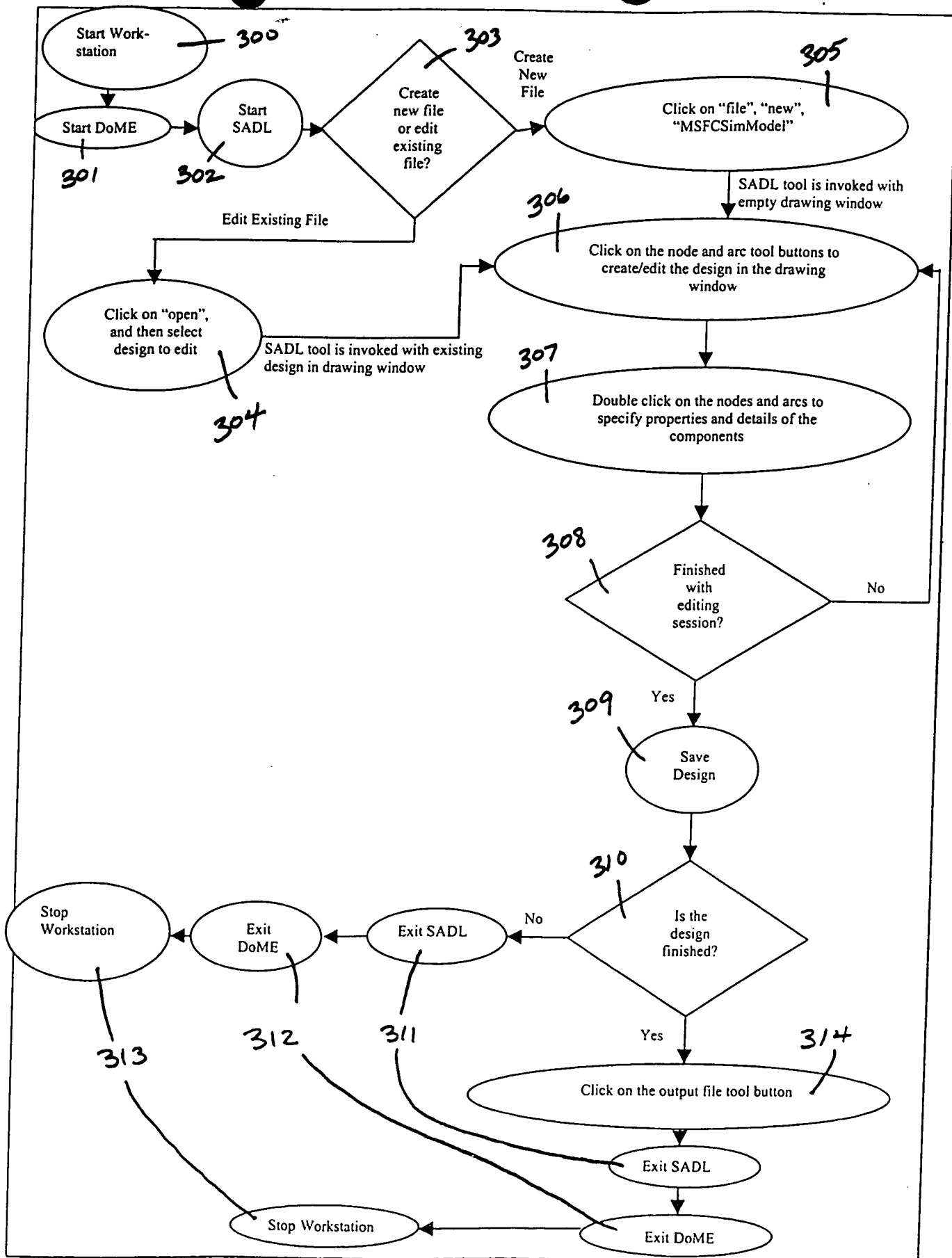


Fig. 32